

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A control apparatus for an internal combustion engine which generates power by burning a mixture of fuel and air in a cylinder thereof, comprising:

in-cylinder pressure detecting means;

calculating means to calculate a combustion rate at predetermined timing based upon the in-cylinder pressure detected by the in-cylinder pressure detecting means and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

correction means to correct timing of combustion starting in the cylinder so that the combustion rate calculated by the calculating means is equal to a target value,

wherein the calculating means calculates the combustion rate at the predetermined timing based upon a control parameter including a product of the in-cylinder pressure detected by the in-cylinder pressure detecting means and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index;

the predetermined timing is set between first timing set after the opening of an intake valve and before the combustion starting and second timing set after the combustion starting and before the opening of an exhaust valve; and

the calculating means calculates the combustion rate based upon a difference in the control parameter between the first and the second timing and a difference in the control parameter between the first timing and the predetermined timing.

2. (Canceled)

3. (Canceled)

4. (Original) A control apparatus for an internal combustion engine which generates power by burning a mixture of fuel and air in a cylinder thereof, comprising:

in-cylinder pressure detecting means;

calculating means to calculate a heat generation rate at predetermined timing based upon the in-cylinder pressure detected by the in-cylinder pressure detecting means and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

correction means to correct timing of combustion starting in the cylinder based upon the heat generation rate calculated by the calculating means.

5. (Original) The control apparatus for the internal combustion engine according to claim 4, wherein:

the step (b) includes calculating the heat generation rate at the predetermined timing based upon a control parameter including a product of the in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index.

6. (Original) The control apparatus for the internal combustion engine according to claim 5, wherein:

the calculating means calculates the heat generation rate based upon a difference in the control parameter between two predetermined points.

7. (Currently Amended) A control method for an internal combustion engine which generates power by burning a mixture of fuel and air comprising the steps of:

(a) detecting an in-cylinder pressure;

(b) calculating a combustion rate at predetermined timing based upon the in-cylinder pressure detected in the step (a) and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

(c) correcting timing of combustion starting in the cylinder so that the combustion rate calculated in the step (b) is equal to a target value,

wherein the step (b) includes calculating the combustion rate at the predetermined timing based upon a control parameter including a product of the in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index;

the predetermined timing is set between first timing set after the opening of an intake valve and before the combustion starting and second timing set after the combustion starting and before the opening of an exhaust valve; and

in the step (b), the combustion rate is calculated based upon a difference in the control parameter between the first and the second timing and a difference in the control parameter between the first timing and the predetermined timing.

8. (Canceled)

9. (Canceled)

10. (Original) A control method for an internal combustion engine which generates power by burning a mixture of fuel and air comprising the steps of:

(a) detecting an in-cylinder pressure;

(b) calculating a heat generation rate at predetermined timing based upon the in-cylinder pressure detected in the step (a) and an in-cylinder volume at timing of detecting the in-cylinder pressure; and

(c) correcting timing of combustion starting in the cylinder based upon the heat generation rate calculated in the step (b).

11. (Original) The control method for the internal combustion engine according to claim 10, wherein:

the step (b) includes calculating the heat generation rate at the predetermined timing based upon a control parameter including a product of the in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the timing of detecting the in-cylinder pressure with a predetermined index.

12. (Original) The control method for the internal combustion engine according to claim 11, wherein:

the step (b) includes calculating the heat generation rate based upon a difference in the control parameter between two predetermined points.

13. (New) The control apparatus for the internal combustion engine according to claim 1, wherein the combustion rate is calculated from in-cylinder pressures taken at only three crank angle positions per engine cycle.

14. (New) The control apparatus for the internal combustion engine according to claim 1, wherein the index is a ratio of specific heat.

15. (New) The control method for the internal combustion engine according to claim 7, wherein the combustion rate is calculated from in-cylinder pressures taken at only three crank angle positions per engine cycle.

16. (New) The control method for the internal combustion engine according to claim 7, wherein the index is a ratio of specific heat.

17. (New) The control method for the internal combustion engine according to claim 11, wherein the timing of combustion starting is advanced when the combustion rate is equal to or smaller than a predetermined value.

18. (New) The control apparatus for the internal combustion engine according to claim 1, wherein a base map for ignition control is updated based upon the correction amount calculated when the difference between the combustion rate and the target value is equal to or smaller than a predetermined value.